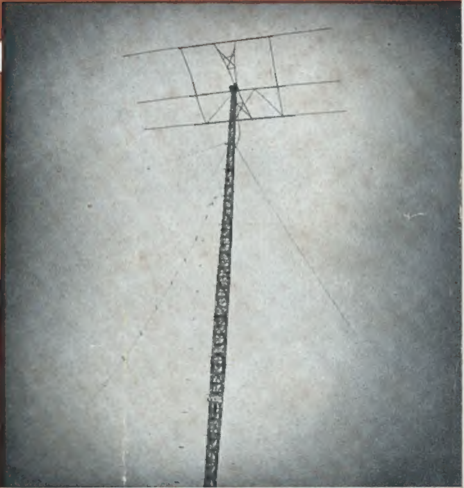
★ AUGUST

Amateur RADIO DIGEST

SIXPENCE



Erecting a Tower

OFFICIAL ORGAN OF THE WIRELESS INSTITUTE OF AUSTRALIA ★ ★ ★

WIRELESS INSTITUTE OF AUSTRALIA

AMATEUR RADIO

Published in the Interests of Radio Amateurs and
Experimenters throughout Australia.

VOL. 8. No. 7. 1st AUGUST, 1940

OUR ORGANISATION

Publishers.—
WIRELESS INSTITUTE OF AUSTRALIA
(Victorian Division)
191 Queen Street, Melbourne, C.1.

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Advertising Department.—
BEDGGOOD ADVERTISING CO.,
129 William Street, Melbourne.
Phone: MU 4046

Printers.—
H. HEARNE & CO. PTY. LTD.,
285 Latrobe Street, Melbourne, C.1.

Accounts Department.—
LARGE & POWERS,
Chartered Accountants (Aust.),
422 Collins Street, Melbourne.

MSS and Magazine Correspondence should be forwarded to The Editor, "Amateur Radio," Box 2611W, G.P.O., Melbourne.

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Subscription Rate is 6/- per annum in advance (post paid).

NOTE.—Advertisers' change of copy must be in hand not later than the 20th of the month preceding publication, otherwise the previous month's copy will be reprinted.

EDITORIAL

With this issue our readers undoubtedly will have noticed the improvement in the appearance of our magazine. We have given it a little more "Shelf Appeal" so that it may take its place amongst the more attractive magazines.

We feel the change has been long overdue, but, as you know, this requires effort, yet the enthusiasm for our hobby, despite restricted activities, gives us the incentive to keep the magazine the link that holds together the fraternity of "Radio Hams" throughout Australia.

It is our earnest endeavour to ensure that this magazine comes to you reguluarly to keep you mindful of the existence of Amateur Radio, and desire to remind you again, that your co-operation, as well as ours, is necessary to keep it as such.

* *

The opinion has often been expressed, both by ourselves in our recent editorials and by numerous amateurs, that the war conditions prevailing today provide an unprecedented opportunity for the amateur operator to serve his country in a practical way.

Amateurs throughout Australia have clearly shown their patriotism by enlisting in one or other of the services in large numbers, whilst many are working in important and reserved occupations. Nevertheless, there is still a great deal that the other Amateurs, not so actively engaged, can do to assist Australia's war effort.

The Victorian Division has obtained the services of several competent Amateurs and various professional telegraphists to act as instructors to students who are being trained for entrance to one of the services.

This morse class is a valuable and definite move to assist and train applicants for enlistment, enabling them to attain a speed of twenty to twenty-five words per minute. The only condition for enrolment is that the applicant has enlisted, or will offer his services, either for active service, or for entrance to the Militia for home service.

This is a practical method for all divisions to assist our country, again demonstrating that the W.I.A. is really a live and active organisation, despite the difficulties we are facing to-day.

* *

EDITORIAL ABSTRACTS.

The W's have new examinations for all classes of amateur operator licenses. The scheme outlined in June "QST" tells us that the old ten-question type of examination, involving much writing on the part of the examinee, is to be abolished. The necessary mathematical questions will still hold as well as the check on one's ability to read and draw circuits. However, the novel system takes the form of "quizzes" of various sorts, whrein the quiz quotient is concealed in a selection of five answers, one of which is right. It sounds easy enough to pick the "goodies," but a fundamental knowledge is still necessary to select the right answer—otherwise the examiner can eaily pick out the candidates practicing the art of guessing. The type B-C ticket contains 50 questions, and the class A, 40. It is claimed that a much better sampling of the candidate's knowledge can be provided by this system, which really allows much more ground to be covered—without making the examination any more difficult. Maybe we shall be trying it ourselves after the scrap.

The Description and Erection of a Tower

By G. W. Ireland, VK3IG.

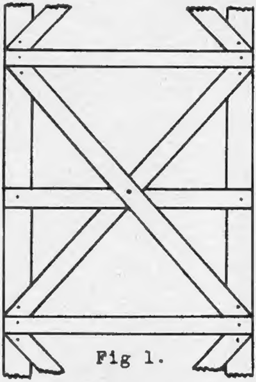
Making of the Tower.

The tower is similar in design to one described earlier in "A.R." The material of the tower is hardwood throughout, both for cheapness and strength. The four corner pieces consist of four, twenty foot, and one ten foot length of 1" x 1" full, making a total length or height of 90 feet. The tower is 18" square at the centre and 6" square at the ends.

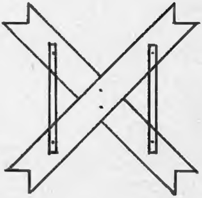
Each 20' length was butted together and lathes nailed over the four faces. Two of these 90' strips or corner pieces were then laid out on the ground, 18" wide at the centre, and 6" at each end. A line was stretched between them, so as to get the same amount of bulge each side of centre. Lathes were then nailed across every 18" apart, beginning at the middle and ends, and filling in, in between, so as to keep the bulge uniform, from one end to the other. Diagonal lathes were then nailed in position. They were put between each horizontal lathe, and they crossed over at the middle of each other second horizontal lathe. (Fig. 1 shows this).

At this point of crossover, the three lathes were nailed together. The other two 90' lengths were treated in the same way. Now I had, what appeared to be, two long ladders side by side, or maybe looked more like a couple of young battle ships lying flat on the ground. (They look much better up). The next job was to make 16 square pieces for the inside of the tower. These were made of 1" x 1" crossd over, and stayed. (See Fig. 2).

The sizes of the inside pieces were about 18" square for the middle, each one being smaller towards the ends, which are about 6" x 6". These pieces were made in pairs, one of each pair to go from the middle to the top, the other from middle to bottom. Now back to where the ladder shaped affairs were side by side on the ground. One was turned over and the 16 inside squares were mounted and nailed on it. The first 18" pair was fixed 3' each side of the centre. Then each pair in order of size was spaced 6' apart towards each end. When this was done about five helpers lifted the other section, or side, on top of the 16 inside pieces. This was where things looked to be getting into shape. Blocks were then put under the bottom side, to raise each end, so as to give it the right shape. The top side was then nailed on. By sighting up through the middle of the tower it was an easy matter to get it symetrical.



A few lathes then tacked on the remaining two sides, which had yet to be lathed, made it strong enough to roll over, and bring the unlathed side up. This filled in, the remaining side was brought to the top and completed. The strength of the tower was found to be good. It could be lifted at the centre, with very little droop at the ends. When lifted at each end it supported a 12 stone chap sitting on the middle. Cost of all woodwork was only 27/6.



Inside piece of tower.
Fig 2.

The Rotary.

A fair idea of the framework for the support of the elements can be seen in the photo. The pair of curved strips are 2" x ¾" hardwood, and are bolted to a thick piece of wood at the middle, it being 15" x 6" and 3" thick. A few cross lathes were used to stay it. The supports for the elements are 2" x 2" oregon, about 17' long. Ordinary split conduit ⅝" was used for elements, and each one was supported at about six places with pairs of egg insulators, wired down to the wood, so as to form a "V" shape. The conduit was wired very tightly to the insulators, so that it could not roll. The conduit has an overhang of 9' on each side. It was kept straight, by giving it a kink, at the beginning of the overhang. It can now be seen that the conduit must not roll over.

Next an 8' piece of 1¼" pipe had enough thread put on one end to fit a flange, then passed through a hole which had been bored in the 3" thick piece of wood, then through another flange which locks down on this piece of wood, and finally a 1¼" x ¾" reducing socket screws on the top. This made a very good joint between the wood and the pipe. A 3' length of ¾" pipe screwed into the reducing socket, had a batch of stay wires on the top of it, to hold up and keep the wooden framework from sagging and flopping about.

A big roller bearing was procured from the wreckers for 2/- also a gear wheel and driving cog. The 1¼" pipe neatly fitted through the bearing, which was slid up until it rested

on the flange. The casing or bottom half of the bearing was set up securely on top of the tower. Another bearing was put inside the tower, about 7' from the top, which held the bottom end of the pipe. This bearing is only to stop wobble. It does not support any weight.

The 12" gear wheel was then bolted to the heavy piece of wood mentioned before. It was meshed with a 2½" driving cog, which was mounted on a shaft on the side of the tower. This shaft had a wooden pulley 12" in diameter fixed to it. The drive for the rotary is a rope passing around this pulley, and down through the tower. A few contraptions at the bottom bring the drive into the shack.

Erection.

The tower was then brought around into position with the top resting on a stack of cases to keep it high enough off the ground, so as to allow the rotary to be seated on the top of the tower or bearing. The feed line was made fast to the tower. Four guy wires were put on about 10' from the top. The bottom end of the tower was resting near a 66' oregon mast of 4" x 4". This may be noticed in the photo with steps on it. This mast was well guyed up with fencing wire.

Two pulleys were then fastened to the 66 feet mast, one at the top and the other 10 feet lower down. Two pulleys were also fixed on the tower, one near the top, the other 15 feet lower. Two long ropes were then anchored on the 66 ft. mast in suitable positions so as to distribute the strain on this mast. If all the strain is at the top the mast will belly out lower down. These two ropes were taken through the two pulleys on the tower, and brought back through the two pulleys on the mast, then down below to a windlass (a piece of ¾" pipe bent like a crank handle). This formed two separate single blocks and tackle.

When all was set and the local gang showed up to do their stuff, the weather busted, and never let up for the rest of the day. A couple of days later, with the word go, it stood vertical in no time. The lift or wind up was child's play, believe it or not, I wound it up one hand and steered the rope across the winder with the other. The weakest link was the 4" x 4" mast. It got very distorted, until the tower passed over the 45 degree angle.

Looking from below it appears to be the size of a ten meter rotary. Since being off the air I put another set of guys at the top to keep it up for the duration.

In conclusion, I'll say a better name for the 3 element rotary is a "qrm filter antenna."

Dawkins Epsy, 21 year old operator of W5CXH, New Orleans, has been named 1939 winner of the Maxim Memorial Trophy Award, which consists of 100 dollars in cash and a bronze replica of the "Wouff Hong" revered symbol of ham ops.

All round activity in amateur radio won the honor for this year's winner. Since 1932 he has been active in amateur doings, experimenting with antennas and writing articles about them for "Q.S.T." and experimenting with remote control.

W5CXH is currently graduating in electrical engineering from the California of Technology. Previous recipients of the award were W2JHB, 1938; W9RSO, 1937, and W6KFC, 1936.

Frequency Modulation

PART II.

By Charles H. Yocum.

With acknowledgments to "Communications."

Early experimenters tried to produce f-m systems, but failed largely because they did not expand the frequency swing, but tried to compress it. However, they did prove that an f-m system counld not make use of conventional a-m modulation methods.

It would be well to review the basic requirements of a successful f-m system before attempting to understand its operation. Major Armstrong lists these requirements as follows:

(1) The frequency transmitted by an f-m system shall vary alternately above and below a fixed frequency which is the assigned carrier. These variations should be symmetrical with respect to the mid-frequency, pass through it, and return exactly to this carrier when modulation stops.

(2) In the transmitter, the frequency deviation of the f-m wave at any instant must be directly proportional to the modulating current resulting from the programme. This deviation in frequency, however, must be independent of the frequency of this modulating current.

(3) In the f-m receiver the detecting device, corresponding to the second detector in an a-m receiver, must respond to changes in frequency only. Changes in amplitude of the incoming signal must be prevented from affecting the detecting device.

(4) The transmitter carrier shall be considered 100% modulated when its output is such that a properly desiged receiver is modulated 100%, or very nearly so. A lower percentage modulation at the transmitter must produce a strictly proportionate and lesser modulation in the receiver.

(5) In the f-m receiver, the amplitude of the current produced by the detecting device, as the result of the receipt of a signal, must be strictly proportionate to the change in frequency at the transmitter, and independent of the rate of change of this frequency.

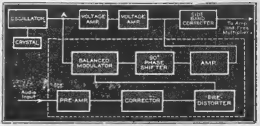


Figure 6a

Modulation means the continuous and reversible change of the r-f output of a transmitter from one set of conditions to another. In the earliest stations this change was accomplished by keying. If the operation of the key interrupts the signal, we have a crude form of amplitude modulation. If the key causes detuning, we have a crude equivalent to f-m transmission.

True frequency modulation is not developed in present day f-m transmitters. Actually phase modulation is produced, then converted to frequency modulation.

Late in 1931, Hans Roder, of General Electric, published a paper in which he developed the theory of three possible types of modulation. It was shown that the amplitude, or the phase, or the frequency of the emitted signal may be varied to convey intelligence. The mathematical derivation of his results is too lengthy for this discussion. Nevertheless, Roder's conclusions are the basis for present f-m designs and can be briefly summed up in the following statements.

Normal a-m transmission may be represented by a carrier of fixed frequency plus two side bands symmetrically located above and below the carrier frequency, in phase with the carrier. These side bands are proportional in amount to the amplitude of the applied programme material.

In both phase and frequency modulation, however, an unlimited

number of upper and lower side frequencies may be produced. With phase modulation, as long as the phase shift is kept less than 30°, the carrier and the first side frequencies predominate, while all the others are present in negligible amounts. Also, if this shift is kept small, the amplitudes of the important side frequencies are very nearly proportional to the impressed audio signal, and the percentage of energy in the undesired side frequencies of third and higher order is but one or two per cent. of the total. (See Table 2.) In both phase and frequency modulation the carrier is 90° (or 270°) out of phase with the side frequencies at peak modulation. At peak modulation the side frequencies are in phase with each other.

Frequency modulation is merely one type of phase modulation in which the amount of phase shift is

Table II. Roder's calculations for frequency-modulated amplitude variations. Phase modulation (last column) should be restricted to less than 30° to avoid serious distortion. Note that in phase modulation the phase shift varies inversely as audio frequency; in true frequency modulation the frequency deviation varies directly as the audio frequency.

AUDIO SIGNAL FREQUENCY (Cycles per Sec.)	CARRIER AMPLITUDE	SIDE FREQUENCY AMPLITUDES								CORRESPONDING PHASE SHIFT
		1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	
10,000	100	2.5	-	-	-	-	-	-	-	2.9°
5000	100	5.0	-	-	-	-	-	-	-	5.7°
2500	99	9.9	-	-	-	-	-	-	-	11.5°
1000	93.8	24.2	3.1	-	-	-	-	-	-	28.6°
500	76.5	44	11.5	1.9	-	-	-	-	-	57.3°
250	22.4	57.7	35.3	12.9	3.4	-	-	-	-	114.6°
100	17.7	32.7	4.6	36.5	39.1	26.1	13.1	5.3	1.8	286°

Amplitudes are expressed as percent of unmodulated carrier.

inversely proportional to the frequency of the audio signal presented to the modulating device.

It is well known that a phase shift of a wave may be developed if we beat or mix with this wave a second wave which is out of phase with it. The amount of phase shift resulting at any instant will be proportional to the phase difference between the two and their respective amplitudes. Therefore, if we can set up a modulating device which will produce a carrier, then mix with it a second wave of like frequency (but whose phase relationship to the carrier depends on the amount of input energy and is inversely proportional to the audio frequency of that input) our problem will be solved.

Two modulators will be discussed. One is the Armstrong circuit used in most transmitters on the air to-day. The other has not been installed in any transmitter to date. It was described at the recent IRE convention in September by Mr. R. E. Shelby of the National Broadcasting Company, who developed it.

Let us consider the Armstrong system first. If we refer to Fig. 6-a, we note a conventional oscillator, crystal controlled, producing a voltage which is divided at point A, part passing through normal voltage amplifiers. This ultimately will be the carrier. The other branch of this circuit is enclosed in dotted lines and represents a practical f-m design.

The input from the microphone passes into a correction network in which the higher audio frequencies are amplified more than the lower frequencies. In any system the higher frequencies are attenuated most in transmission. By use of the corrector we can overcome the attenuation and present a programme to the listener in which both high and low notes are equally well reproduced. This is a common practice in a-m transmission as well as f-m. It is limited in a-m by the necessity of avoiding adjacent channel interference. There is no such danger in the f-m system.

The corrector network contains a resistor RI and a capacity C1. R1 and C1 are in series, and the voltage which drives the succeeding stage is that across C1. The impedance of C1 even at low audio frequencies is negligible compared to R1. Conse-

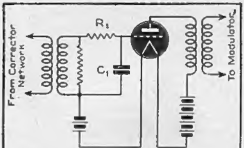


Figure 6b

quently, the voltage presented to the succeeding stages is inversely proportionate to frequency. See Fig. 6-b.

This output is fed to a pair of balanced modulator tubes through a transformer T1. The plate circuits of these modulator tubes are non-reactive for the crystal frequency. Thus, their plate currents are in phase with the control grid voltages. When their screen grids are energized, by a voltage from the input transformer, T1, the output from the modulators is fed to the primary of T2, which has a natural frequency well above that of the master oscillator. The side frequencies generated by this network are shifted 90°, amplified, and fed into resistive load RL. The amplified output of the ocsillator also appears across RL. (See Fig. 7-b).

At any particular frequency, the mount of phase shift in the resultant voltage appearing across RL is proportional to the amplitude and inversely as that frequency. At any particular amplitude or per cent. modulation, the time necessary to change from the normal phase arrangement to some new arrangement, and back to normal again, will be inversely proportional to the actual input frequency. The inverse of this time is caled the **time rate of change.** The wave diagrams in Fig. 7-a will serve to make the progressive changes of the modulated energy more understandable.

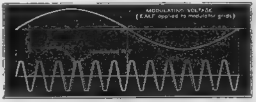


Figure 7a

In this method of modulation, if the maximum frequency swing of the modulator is large compared to the master oscillator frequency, the upper side frequency will be larger than the lower, due to the increased reactance of the primary of T2. If a 15,000 cycle band of frequencies is to be transmitted, and a master oscillator of 75 kc. is used, the upper side frequency will be almost twice the

lower one. This would produce serious distortion in the receiver. This is corrected by an R-C network which is the side frequency equaliser. This correction is accomplished after the side frequencies are combined with the oscillator output at RL. The energy level is low, and little or no amplitude distortion has yet occurred. After equalisation, amplitude linearity is of no importance. Conventional frequency doublers and triplers, modified sufficiently to pass the requisite band width may be used to convert the phase-shifted fundamental frequency of 100 or 200 kc. to 14 or 15 megacycles. Here the output is heterodyned against a second crystal, bringing the fundamental frequency down to 1 or 2 megacycles, but leaving the phase shifts and side frequencies unchanged. This frequency is increased to 40 or 50 megacycles, which is the proper carrier. In this process the original phase shift has been multiplied several thousand times, causing an apparent frequency shift or modulation of the carrier. The large number of frequency doublers is necessary to produce sufficient modulation in the receiver. Suppose a receiver were so built that it required 45° of phase shift to give 100% modulation, as a minimum. We are limited to a maximum phase shift of 30° in the transmitter. (See Table 2). This phase shift will be inversely proportion to frequency. If we are to send an audio band of from 30 to 15,000 cycles per second, then 15,000 cycles would cause a shift of but 6/100's of one degree. Thus, in this assumed case, multiplication by about 1,000 would be required to correctly operate the receiver. Actually, to overcome losses with some safety margin, the original phase shiftshift is increased about 3,000 times in commercial designs.

In the system suggested by R. E. Shelby regular amplitude modulation is produced, with or without high frequency correction. This a-m energy is fed into a phase changing device, which divides the input into two equal parts, 90° out of phase with each other. These quadrature components are fed to a special cathode-ray tube which produces the necessary phase shift as follows: If two voltages, equal in amplitude, but 90° out of phase, are fed to the horizontal and vertical plates of a c-r tube the electron beam will scan a

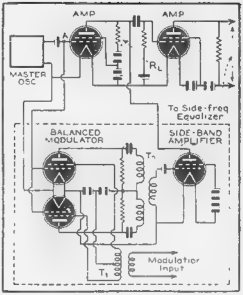


Figure 7b

circular path on the screen. The diameter of the circular path is proportional to the amplitude of the voltage. In place of the conventional c-r screen a mica target is used on which a spiral conducting ribbon is deposited. The spiral is of a particular type, known as the Archimedian spiral.

Phase shifts of upwards of 500 degrees are claimed for this device Thus a considerable saving may be effected in the modulator unit. Fewer frequency doublers and triplers are required to reach the transmitting frequency than in the Armstrong system. But the amount of signal that must be fed to a cathode-ray tube is large. The difficulty of balancing the voltages fed to the horizontal and vertical plates of the cathode-ray tube is somewhat greater than that of balancing the modulator tubes. The output from the cathode-ray tube is far less than that from the balanced modulators, requiring added power amplification. Each circuit has disadvantages but certainly each is extremely ingenious. Hence, further simplification would seem to be inevitable.

The balance of the transmitter is of conventional design, except that in the 50 kw types certain problems had to be solved which were peculiar to the production of such power at 40 megacycles. These were not due to f-m, but were simply u-h-f considerations. The radiator is of special

construction, built to transmit horizontally palarized energy. See Fig. 9.

An f-m transmitter has a wide frequency range. Reasonable care in design and construction results in a system capable of handling frequencies from 30 to 15,000 cycles with ease. Consequently, programme material must be carefully presented to the f-m transmitter since distortion which would be of little importance in other transmitters might be quite objectionable with an f-m system.

Present recordings and wire services are flat to about half the above audio range. This is not objectionable if the transmitter likewise cuts off at about 7 or 8 kc. In f-m stations, however, only the best recordings may be used and many wire services are unsatisfactory because the higher audio frequencies are lost. Wire lines flat to 15 kc. can be built, but are very costly. It again becomes apparent that the change from a-m to f-m cannot come overnight. Not only must we change the transmitter, but the microphones, pre-amplifiers, disc recordings and pick-ups must also be of the finest type if full benefit is to be desired from f-m.

In this connection credit should be given to the Yankee Network. At their Boston studios they are operating a 250 watt, 136-mc. transmitter. This is the first such relay to be used for fixed service. This u-h-f transmitter covers an airline distance of 41 miles to the main transmitter at Paxton, Mass., where the programme is rebroadcast from a 2-kw. transmitter. Soon, however, it will be rebroadcast by a 50-kw. transmitter now under construction.

Two types of f-m receivers are on

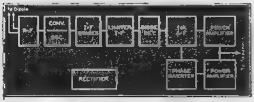


Figure 10

the market. One is for f-m only, one is for both f-m and a-m. Fig. 10 shows the block diagram of a typical f-m receiver. One or more stages of r-f of conventional design are generally used. The oscillator and mixer circuits are not at all different from those used in a-m receivers. However, the i-f transformers are similar to television types. They are really band-pass filters capable of passing a band width of 200 or even 300 kc. One mark of an f-m receiver is the resistance loading always present in these inter-stage transformers. Several problems are solved by this arrangement. These resistors broaden the pass width of the coupling. Also in these circuits, composed of L, C, and R, the rapidly changing frequencies passing through the network may cause the generation of a number of harmonics. These must be dissipated less they cause frequency or amplitude distortion. Loading resistors, of proper value, serve to absorb and dissipate these unwanted effects.

A radical departure in the f-m receiver is the use of a current limiter stage. This limiter follows the i-f amplifiers and is extremely important to the correct operation of the f-m receiver. The function of the limiter is to prevent changes in amplitude from reaching the discriminator. Such changes would appear in the speaker as noticeable distortion. A typical limiter starts to limit with an r-f input of about 3 volts peak, levels off at 5 volts and is reasonably flat to 100 volts or more. This tube is operated as a grid cathode rectifier, and the negative voltage developed across the resistor in the grid circuit from coil to ground may be used for a-v-c. This voltage may likewise be used for manual gain control by applying part of it to the r-f amplifier grids. If a magic eye is to be used as a tuning indicator, it may be located at this point. Note that both the screen and plate voltages of a limiter tube are equal and less than normal to secure sharp cut-off with zero bias.

The device corresponding to the second detector in an a-m receiver is known as the frequency discriminator. This circuit must be so designed that it transforms the frequency swing of the transmitted wave into variations in amplitude in the audio system of the receiver. Depending upon the set, between 20 and 80 volts will be developed when the transmitter frequency swings 75 kc. above or below the carrier. From this point to the loudspeaker the audio system may have any or all of the features associated with present models.

The most sensitive adjustment required in the servicing of the f-m re-

ceiver is that of the discriminator network. Condenser C1 in the primary of the transformer linking the limiter to the discriminator, insures that the receiver is correctly tuned to the exact carrier. If this adjustment is poorly made, the output will be distorted because the wave form fed to the audio system will accentuate the plus frequency changes, limiting the others, or vice versa. Condenser C2 in the secondary of the same transformer insures propor-tional voltage output for various amount of frequency swing.

These two condensers should be adjusted by feeding into the first i-f stage a signal from a service oscillator of the exact i-f of the set. The oscillator should produce as flat an output as possible, over the working range. Connect a v-t voltmeter between Point A and ground (Fig. 11). limiting action should correspond to that described above.

Observe caution in aligning the i-f transformers. It is theoretically possible to widen the pass band of the i-f's by double peaking them. Nevertheless. the need for absolute linearity of phase shift throughout a band 100 or 200 kc. in width suggests that a single peak will introduce less possibility of distortion. This may best be checked by putting a milliammeter in the limiter grid circuit in series with the grid resistor. An oscillator should be connected to the last i-f stage. This stage should be so adjusted that it passes the entire band width with a change in reading of the milliammeter of not more than 1 ma. The same adjustment should then be made for the next i-f and so on, until the mixer tube is reached.

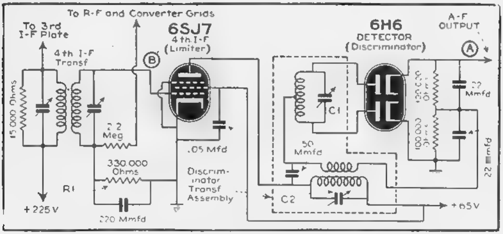


Figure 11

Now vary the frequency fed to the to the i-f by swinging the oscillator over a band at least 200 kc. wide, 100 kc. each side of the i-f. The voltage between point A and ground should be zero at the exact carrier frequency and should be equal in amount, although of opposite electrical sign when the freuency is set equal amounts above or below the i-f. Not more than 3db variation should occur, over the range +100 kc. to —100 kc.

The limiter may be checked by connecting a milliammeter in the limiter plate circuit. meanwhile varying the input voltage supplied by the signal generator, A v-t voltmeter between Point B and ground should indicate an input voltage from 1 or 2 volts to about 100. The

Faults, normally not objectionable will frequently appear in an f-m receiver. Ripple in the power supply, particularly to the plates of the tubes, must be avoided. Microphonics, due to insufficiently rigid mechanical support of coils and condensers, may cause frequency modulation in the receiver itself. Distortion at times may be due to insufficient d-c bias between heater and cathode in the r-f stages. In some cases, it may be necessary to filter the r-f heater leads at the sockets to remove r-f.

In those sets which are adapted to both f-m and a-m reception, it will be found that two general designs are available. In each case a conventional second detector is used for the a-m programmes and a limiter-

(Concluded on page 16)

Overseas Broadcasting

By Jack Harrower. Short Wave Editor, "Radio Times."

One of Europes best known short wave networks is the latest victim of Nazi aggression. It is the French Government Short-wave station, "Paris Mondial."

In the first year of its history the station was known as "Radio Paris," but there were many conflicting reports as to the call sign. It was generally believed to be FYA. But FYA eventually turned out to be a commercial telegraphy station on 20 metres.

Then from out of the blue it was suddenly discovered that the call signs were TPA2, TPA3 and TPA4. At that time the station only had three channels, 15,243 kc., 11,885 kc., and 11,718 kc.

This was followed by a period of rapid expansion. The station identification call became "Paris Mondial" (Paris World Wide), and numerous new channels were opened up for programme transmission from this city of life and gaiety. A new headache, however, was created for the DXer, who, was never quite able to discover all the call signs allocated to the different wave bands. The different transmitters used, and not the frequencies, were allocated call signs of the TPB variety in addition to TPA.

Life in Paris, however, has changed. Nazi stormtroopers strut along the Quai D'Orsay. A curfew has been imposed by Herr Himmler's dreaded Gestapo; everyone must be indoors by 10 p.m. The gay night-

life, which was once an integral part of the city, has disappeared for the Parisienne.

But the Eiffel Tower still towers 985 feet above the Seine, and some day Paris may again call the world. Au Revoir "Paris Mondial."

The FCC has granted the Westinghouse Elect. & Mfg. Co. a construction permit to move its international short wave transmitter, WPIT, from Saxonburg, Pa., to Hull, Mass., and increase its power from 40,000 to 50,000 watts. WRCA, owned by NBC-RCA, at Bound Brook, New Jersey, was granted special experimental authority to operate an additional 35 kw P.A. in parallel with its regular 35 kw amplifier to feed a separate directive antenna, making an effective operating power of 70 kw.

Recognising broadcasting as an American institution on equal footing with the press, and as entitled to the same constitutional right of freedom, the New York World's Fair has set aside July 4 as "Broadcasting Day." In association with the National Association of Broadcasters, the World's Fair directorate has arranged for the event fittingly set for Independence Day. The keystone will be free American radio.

President Roosevelt himself is expected to participate in the ceremonies with an address by remote control from Washington. To preserve a running story of the event, recordings of the day's activities will be made.

RCA's new system of large screen television was given its first public demonstration recently, when pictures 4½ x 6 feet were produced.

Projection optics of extremely wide aperture, a kinescope capable of high voltage operation, using 56,000 volts as compared with the 6,000 or 7,000 volts as used by an ordinary receiver, and apparatus suited to those conditions are said to be the basic elements of the new system. The image on the face of the kinescope, which measures only 2.4 by 3.2 inches faces not toward the screen, but in the opposite direction, being thrown on a concave mirror surface 16 inches in diameter. The mirror collects the strong light from the screen and magnifies the image 22.5 times. The magnified image is then projected back through a glass lens surrounding the neck of the kinescope and thence 20 feet to the screen.

DEFENCE PLAN.

Conversion of the Philco Plant at Philadephia into munitions plant is understood to be under consideration because of the war situation. Preliminary plans for the conversion are already said to be drafted. Several years ago, RCA, Camden, N.J., manufactured bullets for the government under contract at a time when the set field was slack.

Mr. J. Kilgariff, VK5JT, is anxious to contact any of the VK5 W.I.A. members who have joined up, as the South Australian Division is anxious to prepare an Honour List of all members who have enlisted. Please write him, giving call sign and general details.

Divisonal Notes

IMPORTANT.

To ensure insertion all copy must be in the hands of the Editor not later than the 18th of the month preceeding publication.

N.S.W. NOTES.

The June General Meeting of the Division was held as usual at Y.M. C.A. Buildings, and quite a large number of members were present.

Members were informed of the steps taken in an endeavour to remedy caustic comments made by the P.M.G. when speaking of those unlicensed persons, who had been caught breaking the ban on transmisions. Satisfaction was expressed when it was learned that questions had been asked of the P.M.G. in the House of Representatives as to the corectness of his statements.

The Divisional Treasurer, Harold Ackling, VK2PX, has enlisted in the A.I.F., and has been drafted to the Special Wireless Section, Australian Corp of Signals. It is believed that 2PX's birthday is on a sliding scale! Members decided that a presentation should be made to Harold as an appreciation of his services as Treasurer. Other hams in this unit at present are 2ES, 2AHB, 2OZ, and 2ZK (second in command). These amateurs were wished bon voyage by the President and Secretary prior to entraining for Melbourne.

2PX's enlistment necesitated some changes in the office-bearers, and Frank Goyen, 2UX, was elected to the position of Treasurer, and Alan Joscelyne, VK2AJO, Magazine Manager.

A very interesting letter from the South African Radio Relay League was read, and much disappointment was felt when it was learned that all amateur transmissions had ceased in February of this year.

Satisfaction was expressed by those present when it was learned that after nine months of war 95% of the membership was financial.

It has been decided to make the Institute letter of introduction to overseas hams available to all amateurs serving abroad with the forces.

A very interesting demonstration of home-made Talkie and Moving Picture apparatus was given by John Howes, VK2ABS. This machine uses 35 mm. film and the quality of the projected film and its accompanying sound made it hard for members to realise that the whole outfit was home-constructed. It is quite safe to say that the performance could only be bettered by one or two of the leading talkie shows of Sydney.

VK2RA.—Another good ham gone West, or is it Warwick Farm. A few weeks ago, Ray joined the happy (?) band of Benedicts, and all members will wish Ray and his charming bride all the best. Wonder if Ray will put in phone when he gets back on the air again.

VK2PX.—Harold has decided that he would like to meet some of the DX he worked, and has joined the A.I.F. It is heard on good authority that 2PX refused to take his hat off when he went up. Wonder why? It is also understood that he swopped his hair brush for another article that may be more useful to him. Good luck, om.

VK2ZK. — Lieutenant Arthur Henry, winner of the Crawford Trophy, is second in command of Harold's unit, and like 2RA ,was recently married. As one wag remarked that when you enlist it is for the duration and twelve months after, but when you get married, it's—oh, well, we better skip it!

VK2AHB.—Any member of His Majesty's Forces wishing to change his boots for a larger size should get in touch with Arthur. Size 12's. What a grip on Australia. What a terrific kick in the pants some person in the Mediterranean may get.

VK2SS.—Bob rushed into the last meeting very excited. What do you think of this, om. Six months after war's declared I get my first South American card. Now W.A.C.

VK2HC.—Ray has not been enjoying the best of health lately. Many hams will remember 2HC on 80 mx. with his Code lessons for the A.R.A. in the early days. Hope you soon get well again, om.

VK2JU.—To run a series of articles on how to learn the Code. Not really, John?

VK2AKO.—Changing from Flying Boats to Flying Fortresses.

QUEENSLAND DIVISION.
By 4ZU.

4LT.—Believed to belong to that now extinct race of creatures who used to roam this earth emitting a shrill cry sounding like "See-Kew." Hope I am not being too hard on you, Albert OM, but haven't heard of you for ages.

4AW.—Arthur is actually punching a key again. Yep, that's what I said. However, it's not his own, but one belonging to the R.A.A.F. Quite a few of the boys out at Archerfield now, some of them being 4AW, 4OK. 4AH, and 4KK.

4HR.—Tibby seems to be the Mr. Churchill of VK4, inasmuch as he is always smoking a vile cigar. Don't know if Mr. Churchill's are vile or not, but if they are like 4HR's I will feel very sorry for any Germans who come in contact with him. That's what I think of your cigars, Tibby. HI.

4WT.—Now I was going to place old Bill in the same category as 4LT, but rumour hath it that Bill is in camp or something to that effect.

4RT.—John still sharpens lawnmowers in his spare time (and other time), but beyond that I can't say much about him, except his ability to spin a really good yarn. When John says, "Did you hear the one about, etc., etc.," well the mouths shut and the ears fly up as if by magic.

4RY.—Bill still attends to the distribution of "Amateur Radio," so that all you fellows who are wading through these Notes receive your copies promptly.

Pat Kelly.—Well blow me down! That is a surprise, isn't it, Pat. In fact, I can almost hear you saying, "You bet!" How is Thursday Island doing anyway, OM. I hope your fancies haven't run to any of those dusky native girls up there. No doubt it will surprise you to know that the old W.I.A. is still holding out, but it is.

4RF.—Fred was responsible for a picture in "Pix" a couple of weeks back. In case some of you have phenomenal memories, it was a picture of Sydney taken from the porthole of a boat. Of course, you all know that Fred is a naval telegraphist.

4TH.—One of our country men, who continues to support the Institute. Believe me it's appreciated, Doc. Can't you persuade some of the other fellows up there to drop a line to Headquarters and tell us what they are doing.

4UU.—Here I am in the same position as with 4RT. I am quite sure by this that you all know he is Treasurer for this Division. Ah! I nearly forgot one thing—Bill has a motor bike.

4FJ.—Roy astonished everybody by turning up at the last General Meeting. We meet each month you know, Roy, not each six months.

4DY.—Another, shall I say, visitor at the last General Meeting. Hope you have quite recovered from that throat complaint, OM.

4ES.— Another of the old contemptibles, I mean dependables. We can always rely on Herb putting in an appearance each month. Herb has a bug. It has four wheels, too. Quite a fascinating little thing it is.

4JB.—Oscar is a cobber of 4RY's, but beyond the fact that he lives next door to my Boss I haven't any real news.

4JF.—Is a call that used to be heard in many remote parts of the world. In fact, the cards are still filtering through for Jack.

4JU.—We are thinking of offering a prize to the sender of the best suggestion as to what Frank does with his spare time now.

4HU.—George is in the Radio business up in Miles. Used to be severe QRM for me when in VIB. However, QRM always cuts both ways.

4JP.—We see so little of George that I almost forgot you, OM. I suppose you will be using the Rotary to hang washing on any time now.

(Continued from page 12)
discriminator for the f-m. Either one of these is chosen by means of a switch. In order to prevent broad tuning on the a-m position, some designers use two sets of i-f transformers with their outputs ganged with the above switch. An alternate method involves the use of but one set of i-f transformers with a 10 or 20 kc. filter connected in series with the No. 1 grid of the second detector. If this filter is efficient, good results may be obtained on both types of programmes .

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